

Application No. 10/612,883
Amendment
Reply to Office Action of April 6, 2005

PATENT

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A laser scanning apparatus for scanning a monitored zone outside the scanning device apparatus with a pulsed light beam comprising

- a transmission unit, which has a pulsed laser for transmitting a light beam into the zone;
- a light deflection unit to deflect the light beam transmitted by the pulsed laser into the zone to be monitored;
- a reception unit for the reception of light pulses which are reflected by an object located in the zone to be monitored;
- a front screen which transmits the light beam and which separates the transmission unit, the reception unit and the light deflection unit from the outside of the laser scanning apparatus; and
- at least one optical element which splits off a part beam from the transmitted light beam and deflects the part beam to a photo-detector for a measurement of the transmission of the front screen.

Claim 2 (previously presented): A laser scanning apparatus in accordance with claim 1, characterized in that the optical element is coupled to the front screen.

Claim 3 (currently amended): A laser scanning apparatus in accordance with claim 2, characterized in that the optical element is a separate component which can be fastened to the front screen ~~at an inner side thereof~~.

Claim 4 (previously presented): A laser scanning apparatus in accordance with claim 2, characterized in that the optical element is integrated into the front screen.

Application No. 10/612,883
Amendment
Reply to Office Action of April 6, 2005

PATENT

Claim 5 (previously presented): A laser scanning apparatus in accordance with claim 2, characterized in that the optical element is a diffractive optical element.

Claim 6 (previously presented): A laser scanning apparatus in accordance with claim 2, characterized in that the optical element is an optical grid.

Claim 7 (previously presented): A laser scanning apparatus in accordance with claim 1, characterized in that the at least one photo-detector for the measurement of the intensity of the received part beam is disposed on the side of the front screen remote from the light deflection unit.

Claim 8 (previously presented): A laser scanning apparatus in accordance with claim 1, characterized in that the at least one photo-detector for the measurement of the intensity of the received part beam and the light deflection unit are disposed on the same side of the front screen, with the front screen being formed such that the part beam passes through the front screen at least twice.

Claim 9 (previously presented): A laser scanning apparatus in accordance with claim 7, characterized in that the photo-detector is disposed above or beneath the front screen.

Claim 10 (previously presented): A laser scanning apparatus in accordance with claim 1, characterized in that at least one reflector element is disposed on the side of the front screen remote from the light deflection unit.

Claim 11 (previously presented): A laser scanning apparatus in accordance with claim 1, characterized in that at least one reflector element and the light deflection unit are disposed on the same side of the front screen, with the front screen being designed such that the part beam passes through the front screen at least twice.

Claim 12 (previously presented): A laser scanning apparatus in accordance with claim 10, characterized in that at least a part of the part beam can be reflected by the reflector element via the optical element and via the light deflection unit into the reception unit.

Application No. 10/612,883
Amendment
Reply to Office Action of April 6, 2005

PATENT

Claim 13 (previously presented): A laser scanning apparatus in accordance with claim 11, characterized in that at least a part of the part beam can be reflected by the reflector element via the optical element and via the light deflection unit into the reception unit.

Claim 14 (previously presented): A laser scanning apparatus in accordance with claim 10, characterized in that the reflector element is formed as a reference target.

Claim 15 (previously presented): A laser scanning apparatus in accordance with claim 11, characterized in that the reflector element is formed as a reference target.

Claim 16 (previously presented): A laser scanning apparatus in accordance with claim 10, characterized in that the reflector element is disposed above or beneath the front screen.

Claim 17 (previously presented): A laser scanning apparatus in accordance with claim 11, characterized in that the reflector element is disposed above or beneath the front screen.

Claim 18 (previously presented): A laser scanning apparatus in accordance with claim 10, characterized in that the reflector element is formed by a retro-reflecting foil.

Claim 19 (previously presented): A laser scanning apparatus in accordance with claim 11, characterized in that the reflector element is formed by a retro-reflecting foil.

Claim 20 (previously presented): A laser scanning apparatus in accordance with claim 1, characterized in that the light deflection unit is made such that a reference beam can be split off from the transmitted light beam and can be deflected in the direction of a reference target.

Claim 21 (previously presented): A laser scanning apparatus in accordance with claim 20, characterized in that the reference beam can be transmitted through the light deflection unit.

Claim 22 (previously presented): A laser scanning apparatus in accordance with claim 20, characterized in that the reference target is made in a reflecting manner and the light

Application No. 10/612,883
Amendment
Reply to Office Action of April 6, 2005

PATENT

deflection unit is made in a light transmitting manner such that the reference beam can be coupled via the light deflection unit into the reception unit after reflection at the reference target.

Claim 23 (previously presented): A laser scanning apparatus in accordance with claim 21, characterized in that the reference target is made in a reflecting manner and the light deflection unit is made in a light transmitting manner such that the reference beam can be coupled via the light deflection unit into the reception unit after reflection at the reference target.

Claim 24 (previously presented): A laser scanning apparatus in accordance with claim 20, characterized in that the reference target is formed by a retro-reflecting foil.

Claim 25 (previously presented): A laser scanning apparatus in accordance with claim 21, characterized in that the reference target is formed by a retro-reflecting foil.

Claim 26 (currently amended): A laser scanning apparatus in accordance with claim 1, characterized in that the light deflection unit includes a ~~semi-permeable~~ planar mirror.

Claim 27 (currently amended): A laser scanning apparatus in accordance with claim 1, characterized in that the light deflection unit is rotatable about a ~~vertical~~ an axis, in order to monitor an angular range of 360° with the transmitted light beam ~~in a horizontal plane~~.

Claim 28 (previously presented): A laser scanning apparatus in accordance with claim 20, characterized in that the reference beam can be controlled by an operative switching arrangement such that it is only incident on the reference target at predetermined angular positions of the light deflection unit.

Claim 29 (previously presented): A laser scanning apparatus in accordance with claim 21, characterized in that the reference beam can be controlled by an operative switching arrangement such that it is only incident on the reference target at predetermined angular positions of the light deflection unit.

Claim 30 (previously presented): A laser scanning apparatus in accordance with claim 28, characterized in that the operative switching arrangement is an optical arrangement rotating with the light deflection unit.

Application No. 10/612,883
Amendment
Reply to Office Action of April 6, 2005

PATENT

Claim 31 (previously presented): A laser scanning apparatus in accordance with claim 29, characterized in that the operative switching arrangement is an optical arrangement rotating with the light deflection unit.

Claim 32 (currently amended): A laser scanning apparatus in accordance with claim 28, characterized in that the operative switching arrangement is a fixed diaphragm and/or shutter arrangement ~~synchronized with the light deflection unit.~~

Claim 33 (currently amended): A laser scanning apparatus in accordance with claim 29, characterized in that the operative switching arrangement is a fixed diaphragm and/or shutter arrangement ~~synchronized with the light deflection unit.~~

Claim 34 (previously presented): A laser scanning apparatus in accordance with claim 32, characterized in that the shutter arrangement is formed by polarization filters or by grid/diaphragm structures rotatable with respect to one another.

Claim 35 (previously presented): A laser scanning apparatus in accordance with claim 33, characterized in that the shutter arrangement is formed by polarization filters or by grid/diaphragm structures rotatable with respect to one another.

Claim 36 (currently amended): A method for the monitoring of a front screen of a laser scanning apparatus ~~for scanning a monitored zone outside the scanning device with a pulsed light beam having~~

~~_____ a transmission unit, which has a pulsed laser for transmitting a light beam into the zone;~~

~~_____ a light deflection unit to deflect the light beam transmitted by the pulsed laser into the zone to be monitored;~~

~~_____ a reception unit for the reception of light pulses which are reflected by an object located in the zone to be monitored;~~

~~_____ a front screen which transmits the light beam and which separates the transmission unit, the reception unit and the light deflection unit from the outside of the laser scanning apparatus; and~~

Application No. 10/612,883
Amendment
Reply to Office Action of April 6, 2005

PATENT

~~_____ at least one optical element which splits off a part beam from the transmitted light beam and deflects the part beam to a photo-detector for a measurement of the transmission of the front screen;~~

~~_____ the method comprising splitting off a part beam from the a light beam transmitted by the pulsed laser a transmission unit with the an optical element, coupling the optical element to the front screen, and deflecting the part beam through the front screen to determine the transmission of the front screen.~~

Claim 37 (previously presented): A method in accordance with claim 36, characterized in that the intensity of the part beam transmitted through the front screen is measured by means of at least one photo-detector.

Claim 38 (previously presented): A method in accordance with claim 36, characterized in that at least a part of the part beam transmitted through the front screen is reflected back through the front screen and the optical element by means of a reflector element onto a reception unit in which the intensity of the reflected part beam is measured.

Claim 39 (previously presented): A method in accordance with claim 36, characterized in that a reference beam is split off from the transmitted light beam by a light deflection unit and is deflected to a reference target which reflects the reference beam at least partly, with the light deflection unit deflecting the reflected reference beam in the direction of a reception unit in which the intensity of the reflected reference beam is determined.

Claim 40 (new): A method according to claim 36 wherein the optical element is coupled to the front screen.

Claim 41 (new): A method according to claim 36 wherein the light beam is a pulsed laser light beam.

Claim 42 (new): A laser scanning apparatus in accordance with claim 3 wherein the optical element is fastened to an inner side of the front screen.

Application No. 10/612,883
Amendment
Reply to Office Action of April 6, 2005

PATENT

Claim 43 (new): A laser scanning apparatus in accordance with claim 26 wherein the planar mirror is a semi-permeable planar mirror.

Claim 44 (new): A laser scanning apparatus in accordance with claim 27 wherein the axis is a vertical axis and the monitored angular range lies in a horizontal plane.

Claim 45 (new): A laser scanning apparatus in accordance with claim 32 wherein the switching arrangement is synchronized with the light deflection unit.

Claim 46 (new): A laser scanning apparatus in accordance with claim 33 wherein the switching arrangement is synchronized with the light deflection unit.